Gents,

I put together a simple prototype to illustrate the feasibility of a very small Linux KVM based hypervisor. At the end of this email you'll find a detailed break down on LOC per subsystem. Currently the prototype has 380KLOC;

Standard configuration mechanism has been used to 'trim down' the kernel code base. There is still room for improvement (275KLOC is a realistic goal).

Drivers are part of a privileged VM (Same has Xen) and are restartable by definition. Platform code, PCIe, Hotplug, Serial console are part of the Hypervisor therefore _not_ restartable. (See picture at the end)

*** Ultimately, LOC NOT restartable with Xen [ Xen + Dom0 minimal ] is going to be same OR greater than a minimal Linux KVM Hypervisor.

_BUT_

Going with a KVM based Hypervisor as _huge_ advantage:

- Major distribution vendor are using KVM therefore instead of reinventing the wheel we could just piggy back their work.

- KVM is a driver part of mainline Linux; It has ~20KLOC easy to understand. [Xen code based is complex, poorly documented and rely on Python script at runtime!]

- Huge regression test suites exist for Linux

- Xen has customized GDB, Kexec, Backtrace and so on; With KVM _everything_ is standard Linux

- User mode device driver can run directly on top of the Hypervisor without affecting it's stability. For example, things like PF NIC could be adapted to run in User mode.

******* Thin Hypervisor based on KVM *******

```
        Priviledge VM                VM                VM
         |User:   |              |User:   |        |User:   |
         |--------|              |--------|        |--------|
         |Kernel: |              |Kernel: |        |Kernel: |
         |--------|              |-------VF Nic    |-------VF Nic
         |qemu-kvm| <-BackEnd    |qemu-kvm|  |     |qemu-kvm|  |
         ----------   FrontEnd-> ----------  |     ----------  |
             |                               |                 |
       [Pass through]                        |                 |
User:        |                             [ ---PF nic driver--- ]
             |                                        |
-------------|----------------------------------------|----------------
             |                                        |
kernel:      |                              [ User mode Driver ]
             | [ KVM, VT-d / Vt-x ]
             |
-----------------------------
         Hardware
```

```
******* Lines of codes per subsystem *******

Platform Initialization
~~~~~~~~~~~~~~~~~~~~~~~
- Intel IO-APIC, CPU, ACPI, MMU,  TLB                      ---> 61829
- Bootstrap                                                --->  2545
                                                           ----------
                                                                64374
Core Kernel
~~~~~~~~~~~
- Scheduler, Process, Interrupt, Timer, Locking, Signal    ---> 89119
- Memory Management                                        ---> 46106
- SysV IPC                                                 --->  5623
- Block layer                                              ---> 12924
- Device-Driver Model                                      --->  8765
- Virtual File System (VFS)                                ---> 48473
                                                           ----------
                                                               211010
File System
~~~~~~~~~~~
- EXT2                                                     --->  6612
- Code page                                                --->  1404
- Devpts                                                   --->   578
- Procfs                                                   --->  8767
- RamFS                                                    --->   377
- SysFS                                                    --->  3042
- EventFD                                                  --->  2551
                                                           ----------
                                                                23331
Virtualization Support
~~~~~~~~~~~~~~~~~~~~~~
- KVM Driver VT-d VT-x                                     ---> 19915
                                                           ----------
                                                                19915
Drivers
~~~~~~~
- Loopback, TTY                                            ---> 16617
- Ramdisk                                                  --->  2636
- Nvram, RTC                                               --->  3709
- PCI, PCIe, Hotplug                                       ---> 16361
- Platform specific (Intel)                                --->  3874
- User Mode device driver                                  --->   650
                                                           ----------
                                                                43847
Library
~~~~~~~
Generic                                                    ---> 18612
Platform specific                                          --->  1451
                                                           ----------
                                                                20063
TOTAL:
                                                           ----------
                                                               382540
```